CONTENTS OF VOLUME 59

January **Number 1**

W. R. Sheldon, J. R. Benbrook and P. Aimedieu: Ozone depletion in the upper stratosphere at the dawn terminator 1

K. Labitzke and H. van Loon: Total ozone and the 11-yr sunspot cycle 9

J. W. Krzyścin: Detection of a trend superposed on a serially correlated time series 21

A. R. Wood and D. G. Andrews: A spectral model for simulation of tides in the middle atmosphere. I: Formulation 31

A. R. Wood and D. G. Andrews: A spectral model for simulation of tides in the middle atmosphere. II: Results for the diurnal tide 53

A. R. Wood and D. G. Andrews: A spectral model for simulation of tides in the middle atmosphere. III: Results for the semidiurnal tide 79

N. Ptitsyna, T. J. Tuomi, A. Levitin and I. Gromova: Magnetospheric–ionospheric effect on the ground-level atmospheric electric field at Helsinki 99

V. Kharchenko, J. Tharamel and A. Dalgarno: Kinetics of thermalization of fast nitrogen atoms beyond the hard sphere approximation 107

Y. Elsworth, J. J. Lopez-Moreno and J. F. James: High resolution spectrography of hydroxyl in the night airglow 117

T. Landeau, F. Gauthier and N. Ruelle: Further improvements to the inversion of elevation-scan backscatter sounding data 125

S. T. Rybachek, V. I. Ivanov and V. L. Senina: Ionospheric fields excited by sources located in the Earth–ionosphere irregular waveguide 139

January **Number 2**

F. Marenco, A. di Sarra, M. Cacciani, G. Fiocco and D. Fuà: Thermal structure of the winter middle atmosphere observed by lidar at Thule, Greenland, during 1993–1994 151

N. Ortiz de Adler, A. G. Elías and J. R. Manzano: Solar cycle length variation: its relation with ionospheric parameters 159

P. R. Field and H. Rishbeth: The response of the ionospheric F2-layer to geomagnetic activity: an analysis of worldwide data 163

C. O. Hines, H. G. Mayr and C. A. Reddy: On the analysis of geophysical data for an unknown constant, exemplified by the problem of the O^+–O collision cross-section 181

H. Chandra, G. D. Vyas, H. S. S. Sinha, S. Prakash and R. N. Misra: Equatorial spread-F campaign over SHAR 191

J. J. Sojka and R. W. Schunk: Simulations of high latitude ionospheric climatology 207

Rapid Communication
E. V. Voronov and S. V. Fridman: The auroral oval polar boundary position 231

S. E. Milan, T. B. Jones and E. M. Warrington: Enhanced MUF propagation of HF radio waves in the auroral zone 237

J. J. Sojka, R. W. Schunk, M. D. Bowline and D. J. Crain: Ambiguity in identification of polar cap F-region patches: contrasting radio and optical observation techniques 249

Rapid Communication
V. M. Silbergleit: On the occurrence of the largest geomagnetic storms per solar cycle 259

Book reviews 263

February **Number 3**

Rapid Communication
Y. Sahai, V. W. J. H. Kirchhoff and P. C. Alvalá: Pinatubo eruptions: effects on stratospheric O_3 and SO_2 over Brazil 265

M. A. Jarzembski and V. Srivastava: Low pressure experimental simulation of electrical discharges above and inside a cloud 271

P. A. Greet: Mesospheric observations by high-resolution Fabry–Perot spectrometers: calibrations required for climate change studies 281

S. M. L. Melo, H. Takahashi, B. R. Clemesha and J. Stegman: The O_2 Herzberg I bands in the equatorial nightglow 295

F. Yi and Z. Xiao: Evolution of gravity waves through resonant and nonresonant interactions in a dissipative atmosphere 305

C. O. Hines: A fundamental theorem of airglow fluctuations induced by gravity waves 319

C. O. Hines and D. W. Tarasick: Layer truncation and the Eulerian/Lagrangian duality in the theory of airglow fluctuations induced by gravity waves 327

Y. M. Yampolski, P. V. Bliokh, V. S. Beley, V. G. Galushko and S. B. Kascheev: Non-linear interaction between Schumann resonances and HF signals 335

R. Sekar and R. Raghavarao: A case study on the evolution of equatorial spread-F by a nonlinear numerical model using the results from a set of coordinated measurements 343

N. Blaunstein: Evolution of a stratified plasma structure induced by local heating of the ionosphere 351

G. I. Pugacheva, W. N. Spjeldvik, A. A. Gusev and I. M. Martin: On the natural energetic positron population in the Earth's inner radiation belt 363

March **Number 4**

C. O. Hines: Doppler-spread parameterization of gravity-wave momentum deposition in the middle atmosphere. Part 1: Basic formulation 371

C. O. Hines: Doppler-spread parameterization of gravity-wave momentum deposition in the middle atmosphere. Part 2: Broad and quasi monochromatic spectra, and implementation 387

E. M. P. Ekanayake, T. Aso and S. Miyahara: Background wind effect on propagation of nonmigrating diurnal tides in the middle atmosphere 401

A. Tan and G. D. Badhwar: Detecting the dynamical state of the atmosphere from the orbital decay of the ODERACS spheres 431

J.-M. Jahn, J. LaBelle and R. A. Treumann: Evaluating the stationarity of equatorial spread-F time series data 439

A. Osella, A. Favetto and V. Silbergleit: A fractal temporal analysis of moderate and intense magnetic storms 445

W. Kraiński: The east–west component of motion of ionospheric current structures observed under the cleft as magnetic pulsations 453

Book reviews 465

March **Number 5**

B. E. Soukharev: The interannual variability of temperature in the polar stratosphere during the winter: the influence of the QBO phase and an 11-yr solar cycle 469

S. M. L. Melo, H. Takahashi, B. R. Clemesha and D. M. Simonich: An experimental study of the nightglow OH(8-3) band emission process in the equatorial mesosphere 479

C. R. Reddi and G. Ramkumar: The annual and semi-annual wind fields in low latitudes 487

J. Bremer, R. Schminder, K. M. Greisiger, P. Hoffmann, D. Kürschner and W. Singer: Solar cycle dependence and long-term trends in the wind field of the mesosphere/lower thermosphere 497

Yu. I. Portnyagin and T. V. Solovjeva: The role of vertical momentum fluxes in maintaining global meridional circulation in the lower thermosphere/upper mesosphere 511

N. M. Rotanova, Yu. P. Tsvetkov, T. L. Hoang and T. K. T. Nguen: Features of the magnetic field of the equatorial electrojet determined from experimental data for the South-Eastern Asia region 527

D. Nunn: On the numerical modelling of the VLF Trimpi effect 537

S. T. Rybachek, V. I. Ivanov and V. L. Senina: Excitation of the earth-ionosphere irregular waveguide by sources located in an anisotropic ionosphere 561

D. M. Šulić: Ray tracing study of whistlers guided by a field-aligned depression of electron density in the magnetosphere 569

R. G. Ezquer, N. Jakowski and C. A. Jadur: Predicted and measured total electron content over Havana 591

Book reviews 597

April **Number 6**

LARGE-SCALE STRUCTURE, DYNAMICS AND AERONOMY OF THE UPPER ATMOSPHERE

J. M. Forbes and A. H. Manson: Preface 601

S. D. Eckermann, D. K. Rajopadhyaya and R. A. Vincent: Intraseasonal wind variability in the equatorial mesosphere and lower thermosphere: long-term observations from the central Pacific 603

R. R. Clark and J. S. Bergin: Bispectral analysis of mesosphere winds 629

J. E. Salah, W. Deng and R. R. Clark: Observed dynamical coupling through tidal wave propagation in the mesosphere and lower thermosphere at midlatitudes 641

G. G. Shepherd, R. G. Roble, C. McLandress and W. E. Ward: WINDII observations of the 558 nm emission in the lower thermosphere: the influence of dynamics on composition 655

M.-L. Duboin: Dynamics of the thermosphere: diurnal variations observed by WINDII on board UARS 669

T. L. Killeen, A. G. Burns, I. Azeem, S. Cochran and R. G. Roble: A theoretical analysis of the energy budget in the lower thermosphere 675

H. G. Mayr, I. Harris, F. A. Herrero and F. Varosi: Winds and composition changes in the thermosphere using the transfer function model 691

M. Zuzic, L. Scherliess and G. W. Prölss: Latitudinal structure of thermospheric composition perturbations 711

T. J. Immel, J. D. Craven and L. A. Frank: Influence of IMF B_y on large-scale decreases of O column density at middle latitudes 725

May **Number 7**

Review Paper

Q. H. Zhou and M. C. Kelley: Meteor observations by the Arecibo 430 MHz incoherent scatter radar. II. Results from time-resolved observations 739

Rapid Communication

Å. Rabbe and S. H. H. Larsen: Two examples of how the total ozone is influenced by the upper air circulation pattern 753

T. Tsuda, T. E. Van Zandt and H. Saito: Zenith-angle dependence of VHF specular reflection echoes in the lower atmosphere 761

T. Tsuda, W. E. Gordon and H. Saito: Azimuth angle variations of specular reflection echoes in the lower atmosphere observed with the MU radar 777

C. G. Fesen: Geomagnetic activity effects on thermospheric tides: a compendium of theoretical predictions 785

A. P. Nickolaenko: Modern aspects of Schumann resonance studies 805

M. J. Jarvis and K. Morrison: Dynasonde observations of Pc1 propagation in the ionosphere 817

T. J. Fitzgerald: Observations of total electron content perturbations on GPS signals caused by a ground level explosion 829

G. T. Birk and A. Otto: Consequences of a resistive instability operating in the upper auroral ionosphere 835

Book reviews 849

May Number 8

IMAGING RIOMETERS

H. Ranta: Preface 851

J. K. Hargreaves, S. Browne, H. Ranta, A. Ranta, T. J. Rosenberg and D. L. Detrick: A study of substorm-associated nightside spike events in auroral absorption using imaging riometers at South Pole and Kilpisjärvi 853

P. N. Collis and J. K. Hargreaves: Co-ordinated studies using imaging riometer and incoherent scatter radar 873

H. Ranta, A. Ranta, J. K. Hargreaves and S. Browne: Localized absorption events in the afternoon sector 891

M. Nishino, H. Yamagishi, P. Stauning, T. J. Rosenberg and J. A. Holtet: Location, spatial scale and motion of radio wave absorption in the cusp-latitude ionosphere observed by imaging riometers 903

Y. Murayama, H. Mori, S. Kainuma, M. Ishii, I. Nishimuta, K. Igarashi, H. Yamagishi and M. Nishino: Development of a high-resolution imaging riometer for the middle and upper atmosphere observation program at Poker Flat, Alaska 925

E. Nielsen and T. Hagfors: Plans for a new rio-imager experiment in Northern Scandinavia 939

A. Osepian and N. Smirnova: Modelling of absorption layer during auroral absorption events 951

June Number 9

I. M. Fuks, R. S. Shubova and S. I. Martynenko: Lower ionosphere response to conductivity variations of the near-earth atmosphere 961

V. M. Chmyrev, N. V. Isaev, O. N. Serebryakova, V. M. Sorokin and Ya. P. Sobolev: Small-scale plasma inhomogeneities and correlated ELF emissions in the ionosphere over an earthquake region 967

F. Märcz: Short-term changes in atmospheric electricity associated with Forbush decreases 975

R. A. Akmaev: Optimization of a middle atmosphere diagnostic scheme 983

A. H. Manson, C. E. Meek and Q. Zhan: Gravity wave spectra and direction statistics for the mesosphere as observed by MF radars in the Canadian Prairies (49°N–52°N) and at Tromsø (69°N) 993

W. K. Hocking and A. M. Hamza: A quantitative measure of the degree of anisotropy of turbulence in terms of atmospheric parameters, with particular relevance to radar studies 1011

W. G. Elford and A. D. Taylor: Measurement of Faraday rotation of radar meteor echoes for the modelling of electron densities in the lower ionosphere 1021

J. M. Forbes and X. Zhang: Quasi 2-day oscillation of the ionosphere: a statistical study... 1025

M. Popplе, P. J. Chapman, E. C. Thomas and T. B. Jones: RAPIER: a new relocatable VHF coherent radar 1035

J. A. Bittencourt, Y. Sahai, P. R. Fagundes and H. Takahashi: Simultaneous observations of equatorial F-region plasma depletions and thermospheric winds 1049

J. Lichtenberger, Gy. Tarcsai, D. Hamar, A. J. Smith and K. H. Yearby: Two and three component direction-finding computations on whistlers using the Matched Filtering and Parameter Estimation method 1061

A. De Santis, G. De Franceschi and L. Perrone: Spectral and fractal analyses of geomagnetic and riometric antarctic observations and a multidimensional index of activity 1073

July **Number 10**

Review Paper
L. Zhu, R. W. Schunk and J. J. Sojka: Polar cap arcs: a review 1087

Rapid Communication
J.-L. Caccia, M. Crochet and K. Saada: ST radar evaluation of the standard deviation of the air vertical velocity perturbed by the local orography 1127

J. W. Krzyścin and J. Jarosławski: Factors affecting solar UV radiation changes: a study of the new Robertson–Berger meter (UV-biometer model 501A) and Brewer data records taken at Belsk, Poland, 1993–1994 1133

D. K. Chakrabarty and M. Lal: Spectroscopic study of twilight intensity in the red region over Ahmedabad (23°N) after the Mt. Pinatubo eruption 1143

P. K. Patra and S. Lal: Variability of eddy diffusivity in the stratosphere deduced from vertical distributions of N_2O and CFC-12 1149

J.-M. Fillol, P. Broche and M. Crochet: Retrieval of stratified atmospheric reflectivity and wind velocity using inverse methods: application to a VHF ST mini-radar 1159

T. J. Harris and R. A. Vincent: A minimal coherence time for the solar tides in the middle atmosphere 1179

D. H. Giers, Y. Sahai, L. L. Cogger and E. H. Ryan: Occurrence characteristics of mesospheric gravity waves at 51°N 1197

J. O. Adeniyi: Experimental equatorial ionospheric profiles and IRI model profiles 1205

A. V. Mikhailov, M. Förster and M. G. Skoblin: An estimate of the non-barometric effect in the [O] height distribution at low latitudes during magnetically disturbed periods 1209

A. R. W. Hughes and W. K. Rice: A satellite study of low latitude electron and proton whistlers 1217

Book reviews 1223

July **Number 11**

H. Svensmark and E. Friis-Christensen: Variation of cosmic ray flux and global cloud coverage—a missing link in solar-climate relationships 1225

A. S. Besprozvannaya, G. I. Ohl, B. I. Sazonov, I. A. Scherba, T. I. Schuka and O. A. Troshichev: Influence of short-term changes in solar activity on baric field perturbations in the stratosphere 1233

G. Beig and A. P. Mitra: Atmospheric and ionospheric response to trace gas perturbations through the ice age to the next century in the middle atmosphere. Part I — chemical composition and thermal structure 1245

G. Beig and A. P. Mitra: Atmospheric and ionospheric response to trace gas perturbations through the ice age to the next century in the middle atmosphere. Part II — ionization 1261

Ch. Jacobi, R. Schminder and D. Kürschner: The quasi 2-day wave as seen from D1 LF wind measurements over Central Europe (52°N, 15°E) at Collm 1277

O. P. Kolomiitsev, B. M. Reddy and V. A. Surotkin: Sunrise effects in the equatorial F-layer 1287

Y. Z. Su, G. J. Bailey, K. I. Oyama and N. Balan: A modelling study of the longitudinal variations in the north–south asymmetries of the ionospheric equatorial anomaly 1299

Yu. N. Korenkov, V. V. Klimenko, V. A. Surotkin, F. S. Bessarab, N. S. Natsvalyan and M. Förster: Effect of the global neutral hydrogen distribution on the spatial structure and thermal balance in the upper ionosphere 1311

U. P. Singh and R. P. Singh: Study of plasmasphere–ionosphere coupling fluxes 1321

B. Jenkins, R. J. Moffett, J. A. Davies and M. Lester: Nightside ion frictional heating: atomic and molecular ion temperature anisotropy and ion composition changes 1329

E. E. Antonova and N. Yu. Ganushkina: Azimuthal hot plasma pressure gradients and dawn–dusk electric field formation 1343

V. M. Silbergleit, M. M. Zossi de Artigas and J. R. Manzano: Energy dissipation in substorms: plasmoids ejection 1355

Book reviews 1359

August **Number 12**

Review Paper

T. Obara and K. Fukui: Polar auroral arc studies particularly using Akebono satellite and Qaanaaq (Greenland) all-sky imager data 1361

M. Cho and M. J. Rycroft: The decomposition of CFCs in the troposphere by lightning 1373

O. Pinto Jr., O. Mendes, I. R. C. A. Pinto, W. D. Gonzalez, R. H. Holzworth and H. Hu: Atmospheric X-rays in the Southern hemisphere 1381

G. Ja. Khachikjan, A. I. Pogoreltsev and Ja. V. Drobjeva: Mean thermospheric winds at middle latitudes of the northern hemisphere derived from longitudinal variations of the F2-layer peak height 1391

M. A. Arriagada, A. J. Foppiano and M. J. Buonsanto: Solar activity variations of meridional winds over King George Island, Antarctica 1405

Rapid Communication

C. N. Mitchell, L. Kersley and S. E. Pryse: The effects of receiver location in two-station experimental ionospheric tomography 1411

L. A. Hajkowicz: Possible ambiguity in defining the ionospheric origin of quasiperiodic scintillations 1417

E. Belova, E. Pchelkina, W. Lyatsky and A. Pashin: The effect of an ionospheric inhomogeneity on magnetic pulsation polarization 1425

J. K. Walker, V. Yu. Semenov and T. L. Hansen: Synoptic models of high latitude magnetic activity and equivalent ionospheric and induced currents 1435

V. V. Novikov and S. T. Rybachek: The effect of a transverse irregularity on the electromagnetic fields excited by VLF transmitters at ionospheric heights in the Earth-ionosphere waveguide near the terminator 1453

Book reviews 1461

September **Number 13**

EQUATORIAL AERONOMY

S. Fukao: Preface 1463

B. G. Fejer: The electrodynamics of the low-latitude ionosphere: recent results and future challenges 1465

R. S. Lieberman: Long-term variations of zonal mean winds and (1,1) driving in the equatorial lower thermosphere 1483

C. Arduini, U. Ponzi and G. Laneve: Tidal analysis of the San Marco V and San Marco III: Density data in equatorial orbit 1491

M. A. Abdu: Major phenomena of the equatorial ionosphere–thermosphere system under disturbed conditions 1505

C. G. Fesen: Theoretical effects of tides and auroral activity on the low latitude ionosphere 1521

T. J. Fuller-Rowell, M. V. Codrescu, B. G. Fejer, W. Borer, F. Marcos and D. N. Anderson: Dynamics of the low-latitude thermosphere: quiet and disturbed conditions 1533

G. J. Bailey, N. Balan and Y. Z. Su: The Sheffield University plasmasphere ionosphere model—a review 1541

C. R. Huang, C. H. Liu, H. C. Yeh and W. H. Tsai: The low-latitude ionospheric tomography network (LITN)—initial results 1553

I. Kimura, K. Tsunehara, A. Hikuma, Y. Z. Su, Y. Kasahara and H. Oya: Global electron density distribution in the plasmasphere deduced from Akebono wave data and the IRI model 1569

M. Mendillo, J. Baumgardner, M. Colerico and D. Nottingham: Imaging science contributions to equatorial aeronomy: initial results from the MISETA program 1587

J.-M. Jahn, J. LaBelle, J. H. A. Sobral, T. L. Aggson and W. B. Hanson: Detection of an equatorial spread-F bubble by ground-based photometers and the San Marco 5 satellite 1601

J. H. A. Sobral, G. L. Borba, M. A. Abdu, I. S. Batista, H. Sawant, C. J. Zamlutti, H. Takahashi and Y. Nakamura: Post-sunset wintertime 630.0 nm airglow perturbations associated with gravity waves at low latitudes in the South American sector 1611

H. Laakso, N. C. Maynard, R. F. Pfaff, T. L. Aggson, W. R. Coley, P. Janhunen and F. A. Herrero: Electric field diagnostics of the dynamics of equatorial density depletions 1625

A. K. Patra, P. B. Rao, V. K. Anandan and A. R. Jain: Radar observations of 2.8 m equatorial spread-F irregularities 1633

M. C. Kelley and C. A. Miller: Mid-latitude thermospheric plasma physics and electrodynamics: A review 1643

M. Yamamoto, S. Fukao, R. T. Tsunoda, K. Igarashi and T. Ogawa: Preliminary results from joint measurements of *E*-region field-aligned irregularities using the MU radar and the frequency-agile radar 1655

P. J. Espy and R. Huppi: The intertropical convergence zone as a source of short-period mesospheric gravity waves near the equator 1665

B. R. Clemesha, P. P. Batista and D. M. Simonich: Long-term and solar cycle changes in the atmospheric sodium layer 1673

C. A. Tepley: Current developments at Arecibo for research in the atmospheric sciences at low latitudes 1679

September **Number 14**

Review Paper
M. André: Waves and wave-particle interactions in the auroral region 1687

Rapid Communication
T. R. Robinson: A comment on "Nonlinear solitary wave in the ionospheric *E*-region" by Arykov and Maltsev 1713

Rapid Communication
A. A. Arykov and Yu. P. Maltsev: Reply to Robinson's comment on "Nonlinear solitary wave in the ionospheric *E*-region" by Arykov and Maltsev 1715

A. V. Shvets, A. P. Nickolaenko and M. Hayakawa: Characteristics of nearby lightning discharges observed at Singapore 1717

K. Parameswaran, K. Rajeev and K. Sen Gupta: An observational study of night time aerosol concentrations in the lower atmosphere at a tropical coastal station 1727

S. V. Veretenenko and M. I. Pudovkin: Effects of the galactic cosmic ray variations on the solar radiation input in the lower atmosphere 1739

M. Jarisch, D. Offermann, M. Riese and D. J. Wuebbels: Measurements of stratospheric trace gases by a balloon-borne infrared spectrometer in France 1747

C. Raghava Reddi and Geetha Ramkumar: Climatologies of tidal winds in the radio-meteor region over Trivandrum (8°N) 1757

W. K. Hocking and P. K. L. Mu: Upper and middle tropospheric kinetic energy dissipation rates from measurements of $\tilde{C}_n^2$— review of theories, *in situ* investigations, and experimental studies using the Buckland Park atmospheric radar in Australia 1779

K. L. Miller, M. Lemon and P. G. Richards: A meridional wind climatology from a fast model for the derivation of meridional winds from the height of the ionospheric *F2* region 1805

T.-Z. Ma and R. W. Schunk: Effect of polar cap patches on the thermosphere for different solar activity levels 1823

V. E. Gherm, N. N. Zernov, B. Lundborg and A. Västberg: The two-frequency coherence function for the fluctuating ionosphere: narrowband pulse propagation 1831

V. E. Gherm, N. N. Zernov and B. Lundborg: The two-frequency, two-time coherence function for the fluctuating ionosphere: wideband pulse propagation 1843

J. Verö, L. Holló, P. Bencze and F. Märcz: Whistler ducts and geomagnetic pulsation resonant field line shells near $L=2$—are they identical? 1855

V. Yu. Trakhtengerts and M. J. Rycroft: A new parametric reflection mechanism for ducted whistlers and an explanation of precursors 1865

October **Number 15**

Review Paper
H. Rishbeth: The ionospheric E-layer and F-layer dynamos – a tutorial review 1873

O. Pinto Jr, I. R. C. A. Pinto, M. Lacerda, A. M. Carvalho, J. H. Diniz and L. C. L. Cherchiglia: Are equatorial negative lightning flashes more intense than those at higher latitudes? 1881

S. Abraham, S. K. Dhaka, K. D. Praveen, N. Nath,* O. P. Nagpal and K. L. Baluja: Lower stratosphere coupling with the mesosphere through the QBO 1885

C. A. Onwumechili: Spatial and temporal distributions of ionospheric currents in subsolar elevations 1891

L. A. Hajkowicz: Characteristic types of ionospheric scintillations at VHF for a typical mid-latitude station over a sunspot cycle (1988–1996) 1901

P. N. Collis: An improved technique to determine neutral winds in the auroral mesosphere using the EISCAT VHF incoherent scatter radar 1909

C. F. del Pozo, J. K. Hargreaves and A. D. Aylward: Ion composition and effective ion recombination rate in the nighttime auroral lower ionosphere 1919

E. Belova, E. Pchelkina, W. Lyatsky and A. Pashin: The effect of ionospheric inhomogeneity on magnetic pulsation polarization: magnetic disturbance on the ground as a function of inhomogeneity magnitude 1945

S. E. Pryse, L. Kersley, M. J. Williams, I. K. Walker and C. A. Willson: Tomographic imaging of the polar-cap ionosphere over Svalbard 1953

S. Salous: On the potential applicability of auto-regressive spectral estimation to HF chirp sounders 1961

N. Borisov and P. Stubbe: Excitation of longitudinal (field-aligned) currents by modulated HF heating of the ionosphere 1973

V. Y. Trakhtengerts, A. G. Demekhov, S. V. Polyakov, J. Manninen, T. Turunen and M. J. Rycroft: ELF/VLF radio signals caused by ionospheric demodulation of MF/HF radio transmitter signals 1991

November **Number 16**

G. P. Garbe and L. L. Cogger: The winter mesopause wind field at 51° North 1999

J. L. Innis, P. L. Dyson and P. A. Greet: Further observations of the thermospheric vertical wind at the auroral oval/polar cap boundary 2009

A. J. Gerrard, T. J. Kane, D. D. Meisel, J. P. Thayer and R. B. Kerr: Investigation of a resonance Lidar for measurement of thermospheric metastable helium 2023

S. B. Malinga and L. M. G. Poole: Atmospheric tides observed at Grahamstown (33.3°S, 26.5°E) 2037

R. Sridharan, H. Chandra, S. R. Das, R. Sekar, H. S. S. Sinha, D. Pallam Raju, R. Narayanan, S. Raizada, R. N. Misra, R. Raghavarao, G. D. Vyas, P. B. Rao, P. V. S. Ramarao, V. V. Somayajulu, V. V. Babu and A. D. Danilov: Ionization hole campaign—a coordinated rocket and ground-based study at the onset of equatorial spread-F: first results 2051

M. K. Barman, A. K. Barbara and M. Devi: Measured and computed ionospheric electron content in the equatorial anomaly crest region 2069

C. N. Mitchell, S. E. Pryse, L. Kersley and I. K. Walker: The correction for the satellite-receiver longitude difference in ionospheric tomography 2077

C. J. Coleman: On the simulation of backscatter ionograms 2089

E. Sonnenschein, D. Censor, I. Rutkevich and J. A. Bennett: Ray trajectories in an absorbing ionosphere 2101

November **Number 17**

R. R. Meier, G. P. Anderson, C. A. Cantrell, L. A. Hall, J. Lean, K. Minschwaner, R. E. Shetter, E. P. Shettle and K. Stamnes: Actinic radiation in the terrestrial atmosphere 2111

M. I. Pudovkin and A. L. Morozova: Time evolution of the temperature altitudinal profile in the lower atmosphere during solar proton events 2159

G. M. Shved and O. A. Gusev: Non-local thermodynamic equilibrium in N_2O, CH_4, and HNO_3 in the middle atmosphere 2167

R. Schminder, D. Kürschner, W. Singer, P. Hoffmann, D. Keuer and J. Bremer: Representative height–time cross-sections of the upper atmosphere wind field over Central Europe 1990–1996 2177

C. K. Meyer and J. M. Forbes: Natural oscillations of the ionosphere–thermosphere–mesosphere (ITM) system 2185

C. Lal: Contribution to F2 layer ionization due to the solar wind 2203

Q. H. Zhou and M. P. Sulzer: Incoherent scatter radar observations of the F-region ionosphere at Arecibo during January 1993 2213

N. A. Zabotin, D. S. Bratsun, S. A. Pulinets and R. F. Benson: Response of topside radio sounding signals to small-scale field-aligned ionospheric irregularities 2231

Book reviews 2247

December **Number 18**

ARTIFICIAL MODIFICATION OF THE IONOSPHERE

B. Thidé: Preface 2251

V. V. Migulin: Investigations of ionospheric modification in Russia 2253

N. V. Bakhmet'eva, V. N. Bubukina, Yu. A. Ignat'ev, G. S. Bochkarev, V. A. Eremenko, V. V. Kol'tsov, I. V. Krasheninnikov and Yu. N. Cherkashin: Investigation by backscatter radar of artificial irregularities produced in ionospheric plasma heating experiments 2257

R. Barr and P. Stubbe: ELF and VLF wave generation by HF heating: A comparison of AM and CW techniques: 2265

R. F. Benson: Evidence for the stimulation of field-aligned electron density irregularities on a short time scale by ionospheric topside sounders 2281

G. S. Bochkarev: Influence of the ionosphere, modified by powerful oblique radiowaves on HF radio wave propagation 2295

G. S. Bochkarev, I. V. Krasheninnikov and G. S. Sales: The effects of powerful oblique radio transmission on the ionosphere on vertical sounding data 2305

E. N. Ermakova and V. Yu. Trakhtengerts: Dispersive properties of a magnetized plasma with strong short-scale irregularities 2313

V. L. Frolov, L. M. Erukhimov, S. A. Metelev and E. N. Sergeev: Temporal behaviour of artificial small-scale ionospheric irregularities: Review of experimental results 2317

M. V. Goldman, D. L. Newman, R. P. Drake and B. B. Afeyan: Theory of convective saturation of Langmuir waves during ionospheric modification of a barium cloud 2335

A. Oikarinen, J. Manninen, J. Kultima and T. Turunen: Observations of intensity variations and harmonics of heater induced VLF waves 2351

V. A. Osherovich, J. Fainberg, R. F. Benson and R. G. Stone: Theoretical analysis of resonance conditions in magnetized plasmas when the plasma/gyro frequency ratio is close to an integer 2361

A. F. Belenov, L. M. Erukhimov, P. V. Ponomarenko and Y. M. Yampolski: Interaction between artificial ionospheric turbulence and geomagnetic pulsations 2367

W. A. Scales, K. T. Cheng and S. Srivastava: Simulation studies of processes associated with stimulated electromagnetic emission (SEE) in the ionosphere 2373

E. N. Sergeev, V. L. Frolov, G. P. Komrakov, B. Thidé and T. Carozzi: Temporal evolution of HF-excited plasma waves, measured at different pump frequencies by stimulated electromagnetic emission (SEE) 2383

T. Sergienko, I. Kornilov, E. Belova, T. Turunen and J. Manninen: Optical effects in the aurora caused by ionospheric HF heating 2401

L. M. Erukhimov and P. I. Shpiro: Numerical simulation of the mutual conversion of ordinary and extraordinary waves in a magnetised plasma by artificial ionospheric turbulence 2409

P. K. Shukla and L. Stenflo: Stimulated scattering of high-power radio waves in multi-component collisional plasmas 2415

M. M. Shvarts and S. M. Grach: Interaction of upper and lower hybrid waves and generation of the downshifted maximum feature of stimulated electromagnetic emissions 2421

L. Stenflo and P. K. Shukla: Comments on the parametric excitation of low-frequency electrostatic waves 2431

A. J. Stocker, T. R. Robinson, T. B. Jones and P. Stubbe: The effect of artificial modification in the E region on HF ray propagation 2435

V. V. Belikovich, E. A. Benediktov, N. P. Goncharov and A. V. Tolmacheva: Diagnostics of the ionosphere and neutral atmosphere at E-region heights using artificial periodic inhomogeneities 2447

J. G. Wang, D. L. Newman and M. V. Goldman: Vlasov simulations of electron heating by Langmuir turbulence near the critical altitude in the radiation-modified ionosphere 2461

I. G. Kondrat'ev, A. V. Kudrin and T. M. Zaboronkova: The use of near-antenna artificial density ducts for increasing the power of VLF radiation in space plasma 2475

AUTHOR INDEX

Abdu, M. A. 1505, 1611
Abraham, S. 1885
Adeniyi, J. O. 1205
Afeyan, B. B. 2335
Aggson, T. L. 1601, 1625
Aimedieu, P. 1
Akmaev, R. A. 983
Alvala, P. C. 265
Anandan, V. K. 1633
Anderson. G. P. 2111
Anderson, D. N. 1533
Andre, M. 1687
Andrews, D. G. 31, 53, 79
Antonova, E. E. 1343
Arduini, C. 1491
Arriagada, M. A. 1405
Arykov, A. A. 1715
Aylward, A. D. 1919
Azeem, I. 675

Babu, V. V. 2051
Badhwar, G. D. 431
Bailey, G. J. 1299, 1541
Bakhmet'eva, N. V. 2257
Balan, N. 1299, 1541
Baluja, K. L. 1885
Barbara, A. K. 2069
Barman, M. K. 2069
Barr, R. 2265
Batista, P. P. 1673
Batista, I. S. 1611
Baumgardner, J. 1587
Beig, G. 1245, 1261
Belenov, A. F. 2367
Beley, V. S. 335
Belikovich, V. V. 2447
Belova, E. 1425, 1945, 2401
Benbrook, J. R. 1
Bencze, P. 1855
Benediktov, E. A. 2447
Bennett, J. A. 2101
Benson, R. F. 2281, 2231, 2361
Bergin, J. S. 629
Besprozvannaya, A. S. 1233
Bessarab, F. S. 1311
Birk, G. T. 835
Bittencourt, J. A. 1049
Blaunstein, N. 351
Bliokh, P. V. 335
Bochkarev, G. S. 2257, 2295, 2305
Borba, G. L. 1611
Borer, W. 1533
Borisov, N. 1973
Bowline, M. D. 249
Bratsun, D. S. 2231
Bremer, J. 497, 2177
Broche, P. 1159
Browne, S. 853, 891
Bubukina, V. N. 2257
Buonsanto, M. J. 1405
Burns, A. G. 675

Caccia, J. -L. 1127
Cacciani, M. 151
Carozzi, T. 2383
Carvalho, A. M. 1881
Censor, D. 2101
Centrell, C. A. 2111
Chakrabarty, D. K. 1143
Chandra, H. 191, 2051
Chapman, P. J. 1035
Cheng, K. T. 2373
Cherchiglia, L. C. L. 1881
Cherkashin, Yu. N. 2257
Chmyrev, V. M. 967
Cho, M. 1373
Clark, R. R. 629, 641
Clemesha, B. R. 295, 479, 1673
Cochran, S. 675
Codrescu, M. V. 1533
Cogger, L. L. 1197, 1999
Coleman, C. J. 2089
Colerico, M. 1587
Coley, W. R. 1625
Collis, P. N. 873, 1909
Crain, D. J. 249
Craven, J. D. 725
Crochet, M. 1127, 1159

Dalgarno, A. 107
Danilov, A. D. 2051
Das, S. R. 2051
Davies, J. A. 1329
De Santis, A. 1073
De Franceschi, G. 1073
del Pozo, C. F. 1919
Demekhov, A. G. 1991
Deng, W. 641
Detrick, D. L. 853
Devi, M. 2069
Dhaka, S. K. 1885
di Sarra, A. 151
Diniz, J. H. 1881
Drake, R. Paul. 2335
Drobjeva, Ja. V. 1391
Duboin, M. -L. 669
Dyson, P. L. 2009

Ebel, A. 465
Eckermann, S. D. 603
Elford, W. G. 1021
Elias, A. G. 159
Elsworth, Y. 117
Eremenko, V. A. 2257

Ermakova, E. N. 2313
Erukhimov, L. M. 2317, 2367, 2409
Espy, P. J. 1665
Ezquer, R. G. 591

Fagundes, P. R. 1049
Fainberg, J. 2361
Favetto, A. 445
Fejer, B. G. 1465, 1533
Fesen, C. G. 785, 1521
Field, P. R. 163
Fillol, J. -M. 1159
Fiocco, G. 151
Fitzgerald, T. J. 829
Foppiano, A. J. 1405
Forbes, J. M. 601, 1025, 2185
Forster, M. 1209, 1311
Frank, L. A. 725
Fridman, S. V. 231
Friis-Christensen, E. 1225
Frolov, V. L. 2317, 2383
Fua, D. 151
Fukao, S. 1463, 1655
Fuks, I. M. 961
Fukui, K. 1361
Fuller-Rowell, T. J. 1533

Galushko, V. G. 335
Ganushkina, N. Yu. 1343
Garbe, G. P. 1999
Gauthier, F. 125
Gerrard, A. J. 2023
Gherm, V. E. 1831, 1843
Giers, D. H. 1197
Goldman, M. V. 2335, 2461
Goncharov, N. P. 2447
Gonzalez, W. D. 1381
Gordon, W. E. 777
Grach, S. M. 2421
Greet, P. A. 281, 2009
Greisiger, K. M. 497
Gromova, I. 99
Gusev, A. A. 363
Gusev, O. A. 2167

Hagfors, T. 939
Hajkowicz, L. A. 1417, 1901
Hall, L. A. 2111
Hamar, D. 1061
Hamza, A. M. 1011
Hansen, T. L. 1435
Hanson, W. B. 1601
Hargreaves, J. K. 853, 873, 891, 1919
Harris, I. 691
Harris, T. J. 1179
Hayakawa, M. 1717
Herrero, F. A. 691, 1625
Hikuma, A. 1569
Hines, C. O. 181, 319, 327, 371, 387
Hoang, T. L. 527
Hocking, W. K. 1011, 1779
Hoffmann, P. 497, 2177
Hollo, L. 1855
Holtet, J. A. 903
Holzworth, R. H. 1381
Hu, H. 1381

Huang, C. R. 1553
Hughes, A. R. W. 1217
Huppi, R. 1665

Igarashi, K. 925, 1655
Ignat'ev, Yu. A. 2257
Immel, T. J. 725
Innis, J. L. 2009
Isaev, N. V. 967
Ishii, M. 925
Ivanov, V. I. 139, 561

Jacobi, Ch. 1277
Jadur, C. A. 591
Jahn. J. M. 439, 1601
Jain, A. R. 1633
Jakowski, N. 591
James, J. F. 117
Janhunen, P. 1625
Jarisch, M. 1747
Jaroslawski, J. 1133
Jarvis, M. J. 817
Jarzembski, M. A. 271
Jenkins, B. 1329
Jones, T. B. 237, 1035, 2435

Kainuma, S. 925
Kane, T. J. 2023
Kasahara, Y. 1569
Kascheev, S. B. 335
Kelley, M. C. 739, 1643
Kerr, R. B. 2023
Kersley, L. 1411, 1953, 2077
Keuer, D. 2177
Khachikjan, G. Ja. 1391
Kharchenko, V. 107
Killeen, T. L. 675
Kimura, I. 1569
Kirchhoff, V. W. J. H. 265
Klimenko, V. V. 1311
Kolomiitsev, O. P. 1287
Kol'tsov, V. V. 2257
Komrakov, G. P. 2383
Kondrat'ev, I. G. 2475
Korenkov, Yu. N. 1311
Kornilov, I. 2401
Krainski, W. 453
Krasheninnikov, I. V. 2257, 2305
Krzyscin, J. W. 21, 1133
Kudrin, A. V. 2475
Kultima, J. 2351
Kurschner, D. 497, 1277, 2177

Laakso, H. 1625
LaBelle, J. 439, 1601
Lacerda, M. 1881
Lal, M. 1143
Lal, C. 2203
Lal, S. 1149
Landeau, T. 125
Laneve, G. 1491
Larsen, S. H. H. 753
Latbtzke, K. 9
Lean, L. A. 2111
Lemon, M. 1805
Lester, M. 1329

Levitin, A. 99
Lichtenberger, J. 1061
Lieberman, R. S. 1483
Liu, C. H. 1553
Lopez-Moreno, J. J. 117
Lundborg, B. 1831, 1843
Lyatsky, W. 1425, 1945

Ma, T. -Z. 1823
Malinga, S. B. 2037
Maltsev, Yu. P. 1715
Manninen, J. 1991, 2401, 2351
Manson, A. H. 601, 993
Manzano, J. R. 159, 1355
Marcos, F. 1533
Marcz, F. 975, 1855
Marenco, F. 151
Martin, I. M. 363
Martynenko, S. I. 961
Maynard, N. C. 1625
Mayr, H. G. 181, 691
McLandress, C. 655
Meek, C. E. 993
Meier, R. R. 2111
Meisel, D. D. 2023
Melo, S. M. I. 295, 479
Mendes, O. 1381
Mendillo, M. 1587
Metelev, S. A. 2317
Meyer, C. K. 2185
Migulin, V. V. 2253
Mikhailov, A. V. 1209
Milan, S. E. 237
Miller, C. A. 1643
Miller, K. L. 1805
Minschwaner, K. 2111
Misra, R. N. 191, 2051
Mitchell, C. N. 1411, 2077
Mitra, A. P. 1245, 1261
Miyahara, S. 401
Moffet, R. J. 1329
Mori, H. 925
Morozova, A. L. 2159
Morrison, K. 817
Mu, P. K. L. 1779
Murayama, Y. 925

Nagpal, O. P. 1885
Nakamura, Y. 1611
Narayanan, R. 2051
Nath, N.♣ 1885
Natsvalyan, N. S. 1311
Newman, D. L. 2335, 2461
Nguen, T. K. T. 527
Nickolaenko, A. P. 805, 1717
Nielsen, E. 939
Nishino, M. 903, 925
Nottingham, D. 1587
Novikov, V. V 1453
Nunn, D. 537

Obara, T. 1361
Obernberger, I. 2251
Offermann, D. 1747
Ogawa, T. 1655
Ohl, G. I. 1233
Oikarinen, A. 2351
Onwumechili, C. A. 1891
Ortiz de Adler, N. 159
Osella, A. 445
Osepian, A. 951
Osherovich, V. A. 2361
Otto, A. 835
Oya, H. 1569
Oyama, K. I. 1299

Pallam Raju, D. 2051
Parameswaran, K. 1727
Pashin, A. 1425, 1945
Patra, P. K. 1149, 1633
Pchelkina, E. 1425, 1945
Peel, D. A. 465
Perrone, L. 1073
Pfaff, R. F. 1625
Pinto, O. Jr. 138, 1881
Pinto, I. R. C. A. 1381, 1881
Pogoreltsev, A. I. 1391
Polyakov, S. V. 1991
Ponomarenko, P. V. 2367
Ponzi, U. 1491
Poole, L. M. G. 2037
Portnyagin, Yu. I. 511
Popple, M. 1035
Prakash, S. 191
Praveen, K. D. 1885
Prolss, G. W. 711
Pryse, S. E. 1411, 1953, 2077
Ptitsyna, N. 99
Pudovkin, M. I. 1739, 2159
Pugacheva, G. I. 363
Pulinets, S. A. 2231

Rabbe, A. 753
Raghava Reddi, C. 1757
Raghavarao, R. 343, 2051
Raizada, S. 2051
Rajopadhyaya, D. K. 603
Ramarao, P. V. S. 2051
Ramkumar, G. 487, 1757
Ranta, A. 853, 891
Ranta, H. 851, 853, 891
Rao, P. B. 1633,
Reddi, C. R. 487
Reddy, C. A. 181
Reddy, B. M. 1287
Rejeev, K. 1727
Rice, W. K. 1217
Richards, P. G. 1805
Riese, M. 1747
Rishbeth, H. 163, 1873
Robinson, T. R. 1713, 2435
Roble, R. G. 655, 675
Rosenberg, T. J. 853, 903
Rotanova, N. M. 527
Ruelle, N. 125
Rutkevich, I. 2101
Ryan, E. H. 1197
Rybachek, S. T. 139, 561, 1453
Rycroft, M. J. 1373, 1865, 1991

Saada, K. 1127
Sahai, Y. 265, 1049, 1197

Saito, H. 761,
Salah, J. E. 641
Sales, G. S. 2305
Salous, S. 1961
Sawant, H. 1611
Sazonov, I. 1233
Scales, W. A. 2373
Scherba, I. A. 1233
Scherliess, L. 711
Schminder, R. 497, 1277, 2177
Schuka, T. I. 1233
Schunk, R. W. 207, 249, 1087, 1823
Sekar, R. 343, 2051
Semenov, V. Yu. 1435
Sen Gupta, K. 1727
Senina, V. L. 139, 561
Serebryakova, O. N. 967
Sergeev, E. N. 2317, 2383
Sergienko, T. 2401
Sheldon, W. R. 1
Shepherd, G. G. 655
Shetter, R. E. 2111
Shettle, E. P. 2111
Shpiro, P. I. 2409
Shubova, R. S. 961
Shukla, P. K. 2415, 2431
Shvarts, M. M. 2421
Shved, G. M. 2167
Shvets, A. V. 1717
Silbergeit, V. M. 259, 445, 1355
Simonich, D. M. 479, 1673
Singer, W. 497, 2177
Sinha, H. S. S. 191, 2051
Skoblin, M. G. 1209
Smirnova, N. 951
Smith, A. J. 1061
Sobolev, Ya. P. 967
Sobral, J. H. A. 1601, 1611
Sojka, J. J. 207, 249, 1087
Solovjeva, T. V. 511
Somayajulu, V. V. 2051
Sonnenschein, E. 2101
Sorokin, V. M. 967
Soukharev, B. E. 469
Spjeldvik, W. N. 363
Sridharan, R. 2051
Srivastava, V. 271
Srivastava, S. 2373
Stamnes, K. 2111
Stauning, P. 903
Stegman, J. 295
Stenflo, L. 2415, 2431
Stocker, A. J. 2435
Stone, R. G. 2361
Stubbe, P. 1973, 2265, 24352265
Su, Y. Z. 1299, 1541, 1569
Sulic, D. M. 569
Sulzer, M. P. 2213
Surotkin, V. A. 1287, 1311
Svensmark, H. 1225

Takahashi, H. 295, 479, 1049, 1611
Tan, A. 431
Tarasick, D. W. 327
Tarcsai, Gy. 1061
Taylor, A. D. 1021
Tepley, C. A. 1679
Tharamel, J. 107
Thayer, J. P. 2023
Thidé, B. 2383
Thomas, E. C. 1035
Tolmacheva, A. V. 2447
Trakhtengerts, V. Yu. 1865, 1991, 2313
Treumann, R. A. 439
Troshichev, O. A. 1233
Tsai, W. H. 1553
Tsuda, T. 761, 777
Tsunehara, K. 1569
Tsunoda, R. T. 1655
Tsvetkov, Yu. P. 527
Tuomi, T. J. 99
Turunen, T. 1991, 2351, 2401

Van Zandt, T. E. 761
Van Loon, H. 9
Varosi, F. 691
Vastberg, A. 1831
Veretenenko, S. V. 1739
Vero, J. 1855
Vincent, R. A. 603, 1179
Voronov, E. V. 231
Vyas, G. D. 191, 2051

Walker, I. K. 1953, 2077
Walker, J. K. 1435
Wang, J. G. 2461
Ward, W. E. 655
Warrington, E. M. 237
Williams, M. J. 1953
Williamson, M. 466
Willson, C. A. 1953
Wood, A. R. 31, 53, 79
Wuebbels, D. J. 1747

Xiao, Z. 305

Yamagishi, H. 903, 925
Yamamoto, M. 1655
Yampolski, Y. M. 335, 2367
Yearby, K. H. 1061
Yeh, H. C. 1553
Yi, F. 305

Zaboronkova, T. M. 2475
Zabotin, N. A. 2231
Zamlutti, C. J. 1611
Zernov, N. N. 1831, 1843
Zhan, Q. 993
Zhang, X. 1025
Zhou, Q. H. 739, 2213
Zhu, L. 1087
Zossi de Artigas, M. M. 1355
Zuzic, M. 711

PRINTED AND BOUND IN GREAT BRITAIN BY BPC-AUP ABERDEEN LTD.